Aviation Safety Program
Technical Accomplishment

Next-Generation Datalink Architecture Guidelines for Dissemination of Weather Information

POC: M Jarrell, GRC Date Completed: December 2002

Relevant Milestone: Next-Generation, 2007-2015, Weather Ground-Air Datalink Architecture Guidelines (Level III MS 2.4.2-10)

Shown: Datalink architectures investigated for distribution of weather products (Flight Information Service) information capacity, latency and reliability requirements.

Accomplishment / Relation to Milestone and ETO: A key challenge to realizing Weather in the Cockpit is the datalinking of large weather files in a timely and cost effective manner to the cockpit. This requires leveraging of existing and/or proposed datalinks while preserving the performance of existing traffic on these links. NASA GRC and Johns Hopkins Applied Physics Laboratory through joint funding from the NASA AvSP and the FAA (under an Interagency Agreement on weather datalink research) completed a technical analysis, of potential FIS datalink architectures. Three datalink approaches were investigated: ground-based line of sight (LOS), satellite-based (SATCOM) and a hybrid mix of ground/satellite. This study focused on GA/regional and Transport aircraft users in the 2007-2015 timeframe. Datalink requirements were identified and developed with architectures being ranked on their ability to meet these requirements. LOS systems failed to meet the higher capacity needs for a FIS broadcast system of high or multiple resolution national coverage NEXRAD images and comprehensive set of weather products. LOS was better suited for a regional or low resolution set of weather products. SATCOM architectures provided the capacity and coverage needed for a CONUS high multi-resolution comprehensive set of weather products, though limited in their ability to distribute regional products due to their broad coverage patterns (CONUS). Hybrid systems consisting of a distribution of national products via SATCOM and regional products via LOS systems appears promising due to their complementary nature.

Future Plans: Evaluation Plan for Next-Generation Weather Ground-Air Datalink Technologies (3Q03); Preliminary Integrated Datalink Flight Demonstration Architecture Definition (1Q04); Flight Demonstration Datalink Architecture & System Interface Final Definition (3Q05).

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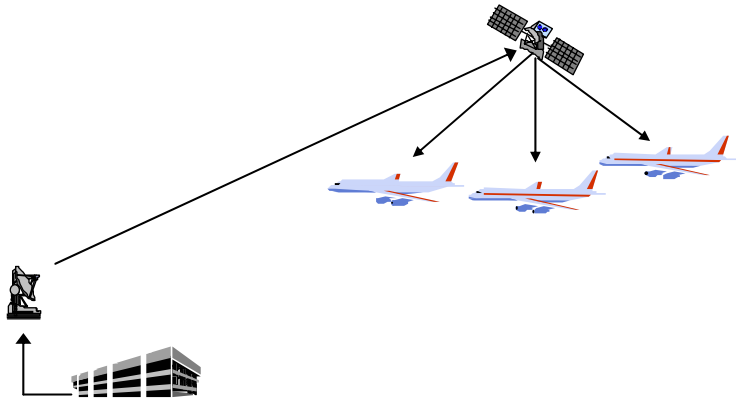
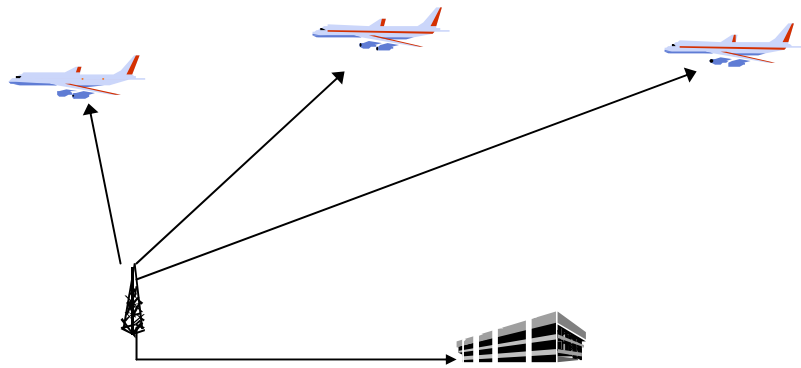
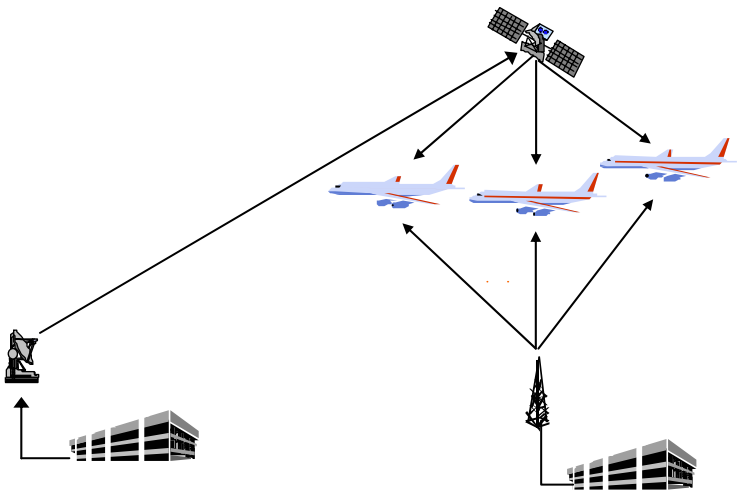


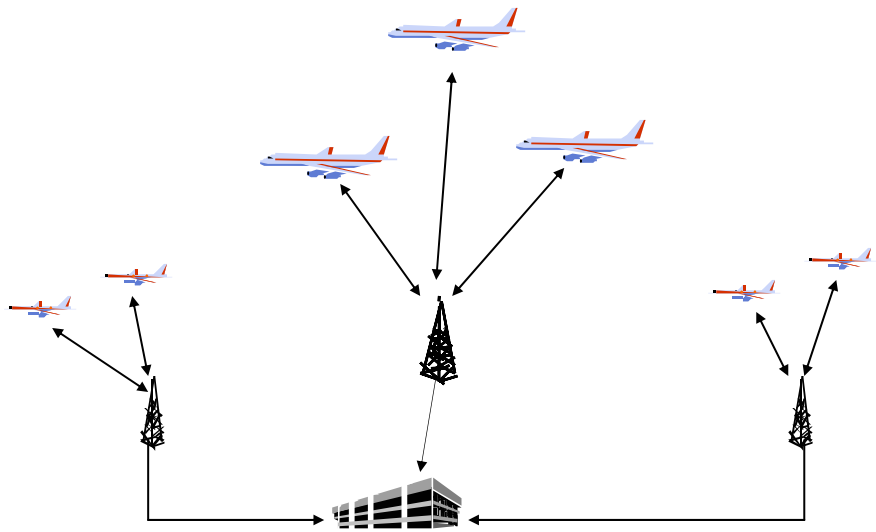
High-Level Functional Flow Broadcast SATCOM



High-Level Functional Flow Terrestrial Broadcast Architecture



High-Level Functional Flow Hybrid Connectivity



High-Level Functional Flow Terrestrial Two-Way Architecture